

CLAIMS

We claim:

- 1 1. A method for post-etch treatment of a semiconductor structure following a dielectric  
2 etch process, wherein said semiconductor structure includes an overlying dielectric layer into  
3 which openings have been etched, wherein the method comprises exposing said  
4 semiconductor structure to a plasma generated from a source gas comprising oxygen, a  
5 nitrogen-comprising gas, and a reactive gas comprising hydrogen, carbon, and fluorine.
- 1 2. The method of Claim 1, wherein said reactive gas comprises at least one hydrogen-  
2 containing fluorocarbon gas.
- 1 3. The method of Claim 2, wherein said hydrogen-containing fluorocarbon gas is  
2 selected from the group consisting of  $\text{CHF}_3$ ,  $\text{CH}_2\text{F}_2$ ,  $\text{CH}_3\text{F}$ ,  $\text{C}_3\text{H}_2\text{F}_6$ , and combinations  
3 thereof.
- 1 4. The method of Claim 1, wherein said reactive gas comprises at least one  
2 fluorocarbon gas and hydrogen.
- 1 5. The method of Claim 4, wherein said fluorocarbon gas is selected from the group  
2 consisting of  $\text{C}_2\text{F}_6$ ,  $\text{C}_3\text{F}_6$ ,  $\text{C}_3\text{F}_8$ ,  $\text{C}_4\text{F}_6$ ,  $\text{C}_4\text{F}_8$ , and combinations thereof.
- 1 6. The method of Claim 1 or Claim 2, or Claim 4, wherein said nitrogen-comprising  
2 gas is  $\text{N}_2$ .

1 7. The method of Claim 1, wherein said method further comprises a flushing step  
2 performed prior to said post-etch treatment.

3 8. The method of Claim 7, wherein said flushing step comprises exposing said  
4 semiconductor structure to a high-flow plasma comprising oxygen.

1 9. The method of Claim 1 or Claim 8, wherein said method further comprises a  
2 cleaning step subsequent to said post-etch treatment.

1 10. The method of Claim 9, wherein said cleaning step is performed while said  
2 semiconductor structure is present in said process chamber.

1 11. The method of Claim 1, wherein said cleaning step is performed after said  
2 semiconductor structure is removed from said process chamber.

1 12. The method of Claim 1, wherein said post-etch treatment method removes a  
2 photoresist layer overlying said dielectric layer.

1 13. A method of post-etch treatment of a semiconductor structure following a dielectric  
2 etch process, wherein said semiconductor structure includes an overlying dielectric layer into  
3 which openings have been etched, wherein the method comprises the steps of:

4 a) a flushing step comprising exposing said semiconductor structure to a high-  
5 flow plasma comprising oxygen;

6 b) a post-etch treatment step comprising exposing said semiconductor structure  
7 to a plasma generated from a source gas comprising oxygen, a nitrogen-comprising gas, and  
8 a reactive gas comprising hydrogen, carbon, and fluorine; and

1 c) a cleaning step comprising exposing at least a process chamber in which said  
2 dielectric etch process was performed to a medium-flow plasma comprising oxygen.

1 14. The method of Claim 13, wherein said reactive gas comprises at least one hydrogen-  
2 containing fluorocarbon gas.

1 15. The method of Claim 14, wherein said hydrogen-containing fluorocarbon gas is  
2 selected from the group consisting of  $\text{CHF}_3$ ,  $\text{CH}_2\text{F}_2$ ,  $\text{CH}_3\text{F}$ ,  $\text{C}_3\text{H}_2\text{F}_6$ , and combinations  
3 thereof.

1 16. The method of Claim 13, wherein said reactive gas comprises at least one  
2 fluorocarbon gas and hydrogen.

1 17. The method of Claim 16, wherein said fluorocarbon gas is selected from the group  
2 consisting of  $\text{C}_2\text{F}_6$ ,  $\text{C}_3\text{F}_6$ ,  $\text{C}_3\text{F}_8$ ,  $\text{C}_4\text{F}_6$ ,  $\text{C}_4\text{F}_8$ , and combinations thereof.

1 18. The method of Claim 13, wherein said nitrogen-comprising gas is  $\text{N}_2$ .

1 19. A controller apparatus programmed to carry out the method of Claim 1 or Claim 13.

1 20. A medium containing data which enables a controller apparatus to carry out the  
2 method of Claim 1 or Claim 13.